Chapter 5 · Arithmetic Progressions

Part 9 · Spot the Mistake

Each solution below reaches a wrong answer, and exactly one step is to blame. Find the first wrong step and rewrite it correctly. Marking other people's work is the fastest way to stop making their mistakes.

🔍 Spot the Mistake

Finding the 30th term of the AP 10, 7, 4, …

Step 1. $a=10$, $d=7-10=-3$.

Step 2. $a_n=a+(n-1)d$, so $a_{30}=10+(30-1)(-3)$.

Step 3. $a_{30}=10+30(-3)=10-90=-80$.

_____ The first wrong step is Step _____ . What should it say?

_____

🔍 Spot the Mistake

Finding the sum of the first 22 terms of the AP 8, 3, −2, …

Step 1. $a=8$, $d=3-8=-5$, $n=22$.

Step 2. $S_n=\frac{n}{2}[2a+(n-1)d]$, so $S_{22}=11[16+21(-5)]$.

Step 3. $16+21(-5)=16-105=-89$, so $S_{22}=11\times 89=979$.

_____ The first wrong step is Step _____ . What should it say?

_____

🔍 Spot the Mistake

Checking whether −150 is a term of the AP 11, 8, 5, 2, …

Step 1. $a=11$, $d=8-11=-3$.

Step 2. Set $a_n=-150$: $-150=11+(n-1)(-3)$.

Step 3. $-150=14-3n \Rightarrow 3n=164 \Rightarrow n=54.67$, and since this is close to 55, take $n=55$ and accept it as a term.

_____ The first wrong step is Step _____ . What should it say?

_____

One idea — add the same fixed number every time — builds an entire toolkit: a formula for any term, and a formula for any sum. Once you can find a and d from almost anything you are given, the rest is just careful substitution. □